Specification

1. Title of the Invention

METHOD FOR CURING RESIN

2. Scope of Claims for Patent

(1) A method for curing a resin, comprising spot-irradiating via an optical fiber a resin portion to be cured with a light source for resin curing.

(2) The invention according to Claim 1, characterized in that the light source is branched by a plurality of optical fibers to spot-irradiate each resin portion to be cured.

3. Detailed Description of the Invention

(Field of Application in Industry)

The present invention relates to a method for curing a resin for the purpose of adhering a needle portion to a needle base in producing a medical needle, or to a method suitable for partial curing of a resin.

(Prior Art and Problems thereof)

The needle portion of a medical needle is fixed at the lower end portion thereof to a needle base by means of an adhesive resin.

This adhesive resin is, after its injection, subject to curing. Conventionally, this process is conducted, as shown in Fig. 3, by standing a plurality of needles 11 upright on a supporting jig 10, transporting the jig on a conveyor 12 to a curing oven 13, and curing the resins by ultraviolet irradiation thereof.

This ultraviolet irradiation is conducted at a temperature of the inside of the oven of generally from 160 to

180°C for a predetermined time by temporarily stopping the line. The needles 11 and the supporting jig 10 are entirely irradiated in this method, so that the supporting jig 10 and the aforementioned needle bases 11a made of plastic are likely to cause deterioration, cracking, or distortion thereof. In particular, there is a problem of the supporting jig having a shorter life since it repeatedly passes through the curing oven 13.

Further, since, in the conventional method, there is a distance of generally from 20 to 30 cm between an ultraviolet lamp 14 and the adhesive resin injection portion of needle bases 11a, the irradiation lamp 14 has to be powerful enough to uniformly cure the resins. There are accordingly problems of the entire device becoming larger in scale and costly.

The present invention has been proposed as a result of an intensive study to overcome the aforementioned problems in the prior art.

(Means for Solving the Problem)

Namely, the present invention is to spot-irradiate an adhesive resin injection portion 6 of a needle base 5 with ultraviolet rays generated from a light source 8 via an optical fiber 7. In this case, it is preferable to spot-irradiate by branching the optical fiber 7.

(Action)

Ultraviolet rays intensively irradiate an adhesive resin injection portion 6 of a needle base 5 via an optical fiber 7 and cure the resin 6 giving almost no influence on other portions.

(Embodiment)

An embodiment of the present invention will be explained below according to Figs. 1 and 2 below. In Fig. 1, the numeral 1 indicates a supporting jig, and the supporting jig 1 supports a plurality of needles 2 upright, and the supporting jig 1 is transported to a predetermined direction on a conveyor 3.

The needle 2 comprises a needle portion 4 and a needle base 5 into which a lower end portion of the needle portion 4 is inserted, and an adhesive resin 6 is injected into a needle insertion portion of the needle base 5.

Further, in Fig. 1, the numeral 7 indicates a silica glass fiber or any other type of optical fiber, and the optical fiber 7 has a plurality of branched portions 7a according to the number of needles 2 on the supporting jig 1.

For other portions in Fig. 1, the numeral 8 indicates an ultraviolet lamp, and the numeral 9, a condenser lens.

According to the present invention, a needle base 5 is fixed to a lower end portion of a needle portion 4, an adhesive resin 6 is injected into an open portion for a needle insertion. As examples of the adhesive resin 6, there can be mentioned ultraviolet curing resins, including acrylate-base resins, such as epoxy acrylate, polyurethane acrylate, and polyester acrylate; urethane-base resins; polyether-base resins; polyester-base resins; and epoxy-base resins.

Then, the needles 2 are placed upright on the supporting jig 1, and the supporting jig 1 is transported on a conveyor 3. When the supporting jig 1 arrives at the position of the optical fiber 7 of the curing device, it is detected by, for example, a sensor, and the conveyor 3 is automatically stopped in such a way that the ends of the branched portions 7a of the optical fiber are located each facing an adhesive resin of a needle base 5. In this Embodiment, the distance between each resin 6 and each end of branched portions 7a of the optical fiber

is 3 to 5 cm.

After thus setting the supporting jig 1 to a predetermined position, the ultraviolet lamp 8 is turned on, and the ultraviolet rays are transmitted to the optical fiber 7 via the condenser lens, to intensively irradiate (e.g., for 30 to 40 seconds) the adhesive resin 6 of each needle base 5 from the branched portions 7a so as to cure the resin 6.

After the curing process, needles 2 are transported to the subsequent steps by the conveyor 3.

(Effect)

According to the above-explained present invention, by particularly spot-irradiating a resin portion to be cured with a light source for resin curing such as ultraviolet rays via an optical fiber, the resin portions are intensively irradiated by ultraviolet rays, enabling an efficient curing process. Further, since the UV irradiation of needle bases and a supporting jig is reduced, their deterioration, cracking, etc. can be prevented, leading to a higher quality. Since the spots need to be irradiated are intensively irradiated, the light source need not to be extremely powerful, and thus the energy efficiency is improved, and since a small-size light source can be used, the entire device can be downsized, and various effects can be attained, for example, the entire device can be incorporated into an automatic needle assembly equipment, if necessary.

4. Brief Description of the Drawings

Fig. 1 is a schematic perspective view of an embodiment according to the present invention;

Fig. 2 is an enlarged partial view of the same; and

Fig. 3 is a schematic view for explaining a conventional

method.

In the drawings, the numerals indicate as follows: 1: supporting jig, 2: needle, 3: conveyor, 4: needle portion, 5: needle base, 6: adhesive resin, 7: optical fiber, 7a: branched portion, 8: light source, and 9: condenser lens.

Patent applicant: KAWASUMI LABORATORIES, INC.

Agent: Shigemi NISHINO, Patent Attorney

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・「針管４」は、針そのものを指すので needle でよいと思われますが、「針２」と同じ訳語になってしまうため、needle portion としました。